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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,622	06/04/2001	Kent Davey	2103.047	4056

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EXAMINER

DAY, HERNG DER

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 05/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/873,622

Applicant(s)

DAVEY, KENT

Examiner

Herng-der Day

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 11 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-9 and 11 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement. ○

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 04 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/7/05, 4/25/05.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

DETAILED ACTION

1. This communication is in response to Applicant's Reply ("Reply") to Office Action dated August 2, 2004, mailed February 2, 2005, and received by PTO February 7, 2005.

1-1. Claim 1 has been amended. Claim 10 has been canceled. Claim 11 has been added.

Claims 1-9 and 11 are pending.

1-2. Claims 1-9 and 11 have been examined and rejected.

Drawings

2. Fig. 2 and Fig. 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application.

Specification

3. The disclosure is objected to because of the following informalities:

Appropriate correction is required.

3-1. It appears that equation (8) as shown at page 7 of the specification is incorrect because it mixes time domain with frequency domain.

3-2. It appears that equation (17) as shown at page 10 of the specification is incorrect because not all the parentheses are in pair.

4. The incorporation of essential material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. Applicant is

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required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office.

The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing the applicant, stating that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter. 37 CFR 1.57(f).

4-1. The attempt to incorporate subject matter into this application by reference to three publications of Applicant, as described at pages 11 and 12, is ineffective because in any application which is to issue as a U.S. patent, essential material may not be incorporated by reference to non-patent publications.

4-2. The incorporation by reference will not be effective until correction is made to comply with 37 CFR 1.57(b), (c), or (d). If the incorporated material is relied upon to meet any outstanding objection, rejection, or other requirement imposed by the Office, the correction must be made within any time period set by the Office for responding to the objection, rejection, or other requirement for the incorporation to be effective. Compliance will not be held in abeyance with respect to responding to the objection, rejection, or other requirement for the incorporation to be effective. In no case may the correction be made later than the close of prosecution as defined in 37 CFR 1.114(b), or abandonment of the application, whichever occurs earlier.

Any correction inserting material by amendment that was previously incorporated by reference must be accompanied by a statement that the material being inserted is the material incorporated by reference and the amendment contains no new matter. 37 CFR 1.57(f).

5. The Examiner thanks Applicant's submitting the requested publications of Davey. They have been placed in the application file.

Claim Objections

6. Claim 1 is objected to because the equation as recited at step c) is incorrect. Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1-9 and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

8-1. Claim 1 recites the limitations of (1) computing core reluctance in step b); (2) using a multi-variable spline analysis in step d); and (3) using a variable metric sequential quadratic program algorithm in step e). However, as described at pages 11 and 12, none of the above-mentioned methodology or technique, which is essential matter to enable one skilled in the art to make and/or use the invention, has been fully disclosed in the specification but is ineffectively incorporated by reference respectively to the three non-patent publications of Applicant.

Therefore, it fails to comply with the enablement requirement.

- 8-2. Claims not specifically rejected above are rejected as being dependent on a rejected claim.

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9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10-1. Claim 6 recites the limitation "repeating steps a-f" in line 3 of the claim. There is insufficient antecedent basis for step f in the claim.

Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claim 1 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 2 of U.S. Patent No. 6,527,695 B1 issued to Davey et al., in view of Ruohonen, "Transcranial Magnetic Stimulation: Modelling and New Techniques", Doctoral Thesis, Department of Engineering Physics and Mathematics, Helsinki University of Technology, 1998, pages 1-50 (IDS 10, filed February 7, 2005).

The conflicting claims are all directed to maximizing stimulation by using membrane voltage equation for optimizing parameters including core reluctance and winding resistance. However, this instant application has an additional limitation "a) allowing the inner and outer core radii to change parametrically in a nested loop". Ruohonen discloses modeling TMS and using the developed models as a basis for engineering modifications that would increase the utility of TMS (page 4, paragraph 3). Specifically, Ruohonen discloses "Coil design must always be taken into account when constructing TMS equipment" (page 23, paragraph 2), "In one study, a mathematical method was used to maximise the focality by changing the coil shape" (page 23, paragraph 1) and "Problems with power consumption and coil heating can be alleviated by reducing the coil's resistance, determined by the wire gauge and coil geometry" (page 23, paragraph 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Davey et al. to incorporate the teachings of Ruohonen

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because “Coil design must always be taken into account when constructing TMS equipment” as suggested by Ruohonen.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Davey et al., U.S. Patent 5,725,471 issued March 10, 1998.

14-1. Regarding claim 11, Davey et al. disclose a magnetic core (magnetic core, column 3, lines 14-17).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davey et al., U.S. Patent 6,527,695 B1 issued March 4, 2003, in view of Ruohonen, “Transcranial Magnetic Stimulation: Modelling and New Techniques”, Doctoral Thesis, Department of Engineering

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Physics and Mathematics, Helsinki University of Technology, 1998, pages 1-50 (IDS 10, filed February 7, 2005).

16-1. Regarding claim 1, Davey et al. disclose a computerized method of optimizing properties of a magnetic core, the core having inner and outer radii and windings, the computerized method having computer-executable instructions for performing the following:

- b) computing core reluctance, number of turns, and winding resistance for each position (reluctance, winding resistance, column 2, lines 49-62);

- c) computing the maximum induced membrane voltage based on the following equation (equation (17), columns 5-6);

- d) fitting the maximum induced membrane voltage to the inner and outer core radii using a multi-variable spline analysis (selected to maximize stimulation, column 2, lines 49-62); and

- e) using a variable metric sequential quadratic program algorithm to compute a value for the inner and outer core radii that maximizes the maximum induced membrane voltage (selecting an optimal winding resistance, column 2, lines 49-62).

Davey et al. fail to disclose a) allowing the inner and outer core radii to change parametrically in a nested loop.

Ruohonen discloses modeling TMS and using the developed models as a basis for engineering modifications that would increase the utility of TMS (page 4, paragraph 3). Specifically, Ruohonen discloses “Coil design must always be taken into account when constructing TMS equipment” (page 23, paragraph 2), “In one study, a mathematical method was used to maximise the focality by changing the coil shape” (page 23, paragraph 1) and “Problems

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with power consumption and coil heating can be alleviated by reducing the coil's resistance, determined by the wire gauge and coil geometry" (page 23, paragraph 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Davey et al. to incorporate the teachings of Ruohonen to obtain the invention as specified in claim 1 because "Coil design must always be taken into account when constructing TMS equipment" as suggested by Ruohonen.

16-2. Regarding claims 2-9, Ruohonen further discloses selecting different wire sizes and selecting the wire size which maximizes the membrane voltage (Optimization should hence begin by selecting the quality criteria and the weighting rules for computing the cost, the coil is the main item to be optimized, maximise the focality by changing the coil shape, and reducing the coil's resistance determined by the wire gauge and coil geometry, section 4.2 - section 4.4, pages 22-24; Monte-Carlo is well known for computing the cost in optimization).

Applicant's Arguments

17. Applicant argues the following:

(1) "With all due respect to the suggestion in the office action, Figures 2 and 3 do not describe only that which is old, and therefore should not be labeled as 'Prior Art'" (page 5, paragraph 2, Reply).

(2) "Applicant respectfully notes that the specification discloses that equation (8) is a Laplace transform" (page 5, paragraph 3, Reply).

(3) "the applicant has corrected a typographical error in the placement of the last parenthesis" (page 5, paragraph 4, Reply).

(4) “contrary to the office action’s characterization, applicant believes that the cited references are not essential material” (page 6, paragraph 1, Reply).

(5) “Applicant respectfully disagrees. If the Examiner wishes to continue the objection to claim 1, applicant respectfully requests clarification as to why the Examiner believes that step (c) is incorrect” (page 6, paragraph 2, Reply).

(6) “Accordingly, while both Davey and the present invention contemplate techniques for optimizing a magnetic core, the Examiner is respectfully requested to recognize the very differently claimed techniques for doing so” (page 7, paragraph 2, Reply).

(7) “Applicants have amended claims 1-9 to recite a computerized method having computer-executable instructions for performing the recited operations” (page 7, paragraph 3, Reply).

Response to Arguments

18. Applicant’s arguments have been fully considered.

18-1. Applicant’s argument (1) is not persuasive. Applicant is encouraged to point out any difference between Figures 2 and 3 of this instant application and Figures 1 and 2 of U.S. Patent 6,527,695 B1.

18-2. Applicant’s argument (2) is not persuasive. Equation (8) is incorrect because it mixes time domain with frequency domain. The expression between two “=” signs is in the time domain. However, the expression after the second “=” sign is in the frequency domain because s represents frequency domain is well known.

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18-3. Applicant's arguments (3) and (5) are not persuasive. Equation (17) is incorrect because not all the parentheses are in pair. In the first line of Equation (17), two right parentheses correspond to one left parenthesis.

18-4. Applicant's argument (4) is not persuasive. Claim 1 recites the limitations of (1) computing core reluctance in step b); (2) using a multi-variable spline analysis in step d); and (3) using a variable metric sequential quadratic program algorithm in step e). Therefore, the above-mentioned methodology or technique is essential matter to enable one skilled in the art to make and/or use the invention. Without disclosing details, undue experimentation is unavoidable.

18-5. Applicant's argument (6) is persuasive. The rejections of claims 1-10 under the judicially created doctrine of obviousness-type double patenting in Office Action dated August 2, 2004, have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made, as detailed in section 12 above.

18-6. Applicant's argument (7) is persuasive. The rejections of claims 1-9 under 35 U.S.C. 101 in Office Action dated August 2, 2004, have been withdrawn.

Conclusion

19. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on February 7, 2005, prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609(B)(2)(i). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE**

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MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

20. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30. Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Jean R. Homere can be reached on (571) 272-3780. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day
May 25, 2005 *H.D.*

Thaif Phan
Thai Phan
Patent Examiner
AU: 2128